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(30) A snap - in unit and matching apertured plate to be used when mounting an electrical connector.

(31) A snap-in unit for an electrical connector, comprising a body (10) arranged to accommodate a standard connector. The socket including the connector is substantially rigid and with a quadratic cross section, and locking means (20) are provided on at least two side surfaces (12, 14), said locking means being adapted to co-operate with other locking means (34) in connection with a rigid plate (30) with a quadratic aperture (32) to accommodate the quadratic socket of the snap-in unit (10) in such a way that the front face of the snap-in unit is substantially parallel to the front surface of the plate. The associated plate is provided with locking means along the rim of the quadratic aperture on the rear side of the plate. Said connector can be mounted in four different ways by turning said connector because the locking means are identical on all four side surfaces.

Fig.1

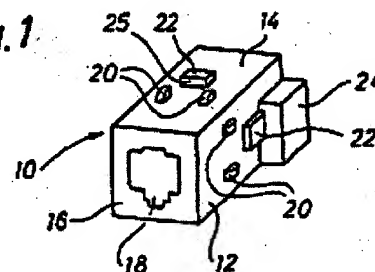
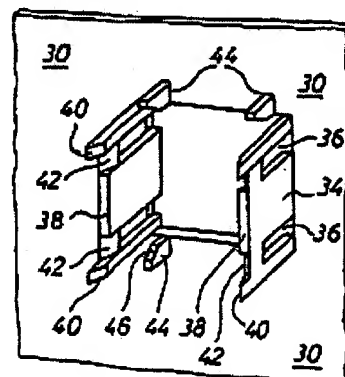


Fig.5



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# A snap-in unit and matching apertured plate to be used when mounting an electrical connector

The invention relates to a snap-in unit for an electrical connector comprising a body arranged to accommodate the connector, preferably a female connector, and provided with a socket, the front face of which includes an insert opening for the connector. Further the invention relates to a plate with an aperture for this snap-in unit.

It is known to use snap-in units with connectors which are clamped onto the apertures of a mounting plate, such as a front plate of a socket box. Such snap-in units are typically provided with resilient clip means to engage the rim of the aperture.

It is known from GB patent application No. 2 000 387 to fasten a multiconnector body onto a rectangular aperture of a plate. It is furthermore known to retain the body by means of clips which are fastened to the two short sides of the rectangular aperture.

It is furthermore known from GB patent application No. 2 037 508 to use a plate with a plurality of punched apertures arranged to receive a plurality of multiconnectors, said multiconnectors being retained by tabs resulting from the punching, and extending from the short sides of the rectangular apertures.

The object of the invention is to facilitate the manufacture and mounting of connectors, especially telephone connectors for data communication, and to enable such connectors to be mounted without the use of tools, to be reliably retained, easy to dismount, possibly with the use of tools, and to be turned and orientated as desired in situ.

This snap-in unit according to the invention is characterised in that the socket including the connector is substantially rigid and has a quadratic cross section and that locking means are provided on at least two sides so as to co-operate with other locking means in connection with a rigid plate with a quadratic aperture able to accommodate the quadratic socket of the snap-in unit in such a way that the quadratic front face is substantially parallel to the front surface of the plate.

The snap-in unit according to the invention implies that because of the quadratic cross section, said snap-in unit can be mounted in four different ways by turning said unit. (The front surface with the insert opening must, of course, still be in substantially the same plane, i.e. parallel to and almost flushing with the surface of the mounting plate) The latter enables an electrician to choose on the basis of the local wiring how to orientate the connector in the best possible manner. The locking means of the snap-in unit are preferably identical on all four sides and are capable of co-operating with the corresponding locking means on the plate. The

locking means of the snap-in unit are preferably in the form of two locking projections and a stop projecting from each side. The locking means of the plate are preferably two opposite flexible locking flaps adapted so as to fit closely to the snap-in unit. When the snap-in unit is inserted, the locking flaps co-operate with the stop and with the locking projections engaging the slots of the locking flaps thereby securing a reliable retention of the connector when subjected to stress from outside, where only the front surface of the connector is accessible. Dismounting can only take place from behind by bending the locking flaps aside by means of a tool, e.g. a screwdriver.

The invention furthermore relates to a plate onto which the snap-in unit is mounted. The plate may e. g. be a steel plate with a plurality of quadratic apertures for use in a main distributing frame or a mounting plate of plastic material in the form of a socket box front plate for a wall outlet from a cable channel and provided with one or two apertures. According to a particular embodiment, the plate is a rather small mounting plate adapted for mounting in a special data connector with a downwards inclining outlet surface, particularly suitable for thick cables which are so rigid that they hardly stand bending at 90°.

The invention will be described below with reference to the accompanying drawings, in which

Figure 1 is a perspective view of an embodiment of the snap-in unit,

Figure 2 is a front view of the snap-in unit, on a larger scale,

Figure 3 is a side view of the snap-in unit, also on a larger scale,

Figure 4 is an front view of an embodiment of a mounting plate for an ordinary wall outlet,

Figure 5 is a fractional rear view of the mounting plate, on a larger scale,

Figure 6 is a sectional view taken along the line I-I of Figure 4 and on a larger scale,

Figure 7 is a sectional view taken along the line II-II of Figure 4,

Figure 8 shows an embodiment of a special data connector with a mounting plate,

Figure 9 shows the mounting plate of Figure 8 with aperture and clip means for a snap-in unit,

Figure 10 is an example of a section of a plate for a main distributing frame,

Figure 11 shows a section of a main distributing frame plate after punching and before bending,

Figure 12 shows a section of the main distributing frame plate of Figure 11 after bending,

Figure 13 is a side view of the main distrib-

uting frame plate of Figure 11, and

Figures 14 to 17 show other embodiments.

A snap-in unit according to the invention comprises a body 10 formed around a female connector of some kind, particularly a standard telephone plug, adapted to receive a cable from a subscriber's telephone.

One end of the snap-in unit 10 is of a quadratic cross section, as is obvious from Figures 1 and 2, and is provided with a number of locking projections 20 on each side surface 12, 14, preferably two on each side. Moreover, each side surface is provided with at least one stop 22. An opening 18 is seen on the front face of the snap-in unit, said opening being adapted for the insertion of a complementary connector on a cable connected to a telephone.

Together with the locking projections 20, the stop 22 is to ensure that the snap-in unit is placed correctly and firmly in an associated plate 30 (shown in Figure 4) provided with quadratic apertures 32 so as to co-operate with the snap-in unit 10. The plate 30 may be part of a socket box in a wall or in a cable channel, but may also be part of a larger installation in the form of a main distributing frame. Along at least one and preferably two opposing rims of each aperture the plate is provided with clip means 34 adapted to co-operate with the locking projections 20 and the stops 22.

The locking projections 20 are preferably provided with an inclined surface 21 facilitating the insertion of the snap-in unit and being provided with a vertical rear rim 23 so as to co-operate with the clip means in retaining the snap-in unit. The stops 22 may be shaped in many ways, but preferably they have a perpendicular front rim, which upon insertion of the snap-in unit in a plate-abut part of the plate 30 or its clip means.

A preferred embodiment of the clip means is shown in detail and on a larger scale in Figures 6 and 7. The clip means comprises two locking flaps, each mainly with the form of a rectangle of almost the same length as the rim of the aperture and half the width and provided with two openings or well-defined slots 36 whose positions correspond to the locking projections 20 of the snap-in unit 10. Both locking flaps are almost perpendicular to the plate 30 - with a slight tendency to incline towards the aperture, as is suggested in Figure 7. The inclination ensures that the locking flaps tightly about the inserted snap-in unit. The middle section of the rim 38 of the locking flaps facing away from the apertured plate is adapted to form a rest for the stop 22 of the snap-in unit 10. The corners of the locking flaps are provided with two projections with inclined guiding surfaces on the side facing the snap-in unit in order to facilitate the insertion of the snap-in unit. Adjacent to the guiding surfaces 40 is a rim portion

defining the slot 36. The rim portion has been provided with an inclined guiding surface 42 which guides the locking projection 20 into the slot during the insertion of the snap-in unit.

In a preferred embodiment the plate 30 is a mounting plate or a front plate, as shown in Figure 4, of a socket box, preferably of the LK-FUGA series (trademark). Such mounting plates and socket boxes are described e.g. DE-A-37 17 363 and DE-U-86 31 155.7. This plate is made of plastic and the locking flaps may be moulded integrally with the plate by using the appropriate moulding tools. Figure 4 is a front view of the plate with the aperture 32 and the locking flaps 34 facing backwards discernible along the rim of the aperture. Because of the shape of the moulding tools, there are four notches along the rim in this embodiment, one for each slot 36 of the locking flaps.

Preferably there are only locking flaps 34 along two opposing rims of the aperture 32 which facilitates the dismantling of the snap-in unit. If there were locking flaps along all four rims, it would be difficult to loosen all four locking engagements at the same time. Along the two rims of the aperture not provided with locking flaps, there may be guiding projections 44 (Figure 5) provided with inclined guiding surfaces 46 on the side facing the aperture, said guiding surfaces ensuring an accurate insertion of the snap-in unit so as to place the front surfaces of said snap-in unit correctly in the aperture.

In the interior of the snap-in unit 10 space has been provided for some form of standard plug, e.g. a telephone plug. The front portion of the snap-in unit must according to the invention be of a quadratic cross section. However, the rear portion of the socket box may be shaped freely so as to match the type of connector used. As shown in Figures 1, 2 and 3, the snap-in unit may therefore have projecting parts 24. In a preferred embodiment the quadratic portion of the snap-in unit measures 15.2 x 15.2 mm, these dimensions providing just enough space for a "modul jack 6/8P" telephone plug.

In case of front plates or mounting plates for wall outlets a plate with one or two apertures 30 is preferably used, as shown in Figure 4, said apertures being provided with clip means along the side rims as shown in Figures 5 and 6. On the rear side the plate may be provided with a number of stiffening ribs thereby ensuring a sufficient rigidity of the plate in relation to the forces of tension and compression it may be subjected to.

The same principle may apply when mounting the snap-in unit in a special cover as shown in Figures 8 and 9. The cover shown is provided with a rather small, hidden diagonal mounting plate, in Figure 8 indicated by means of a dotted line, and

shown in greater detail in Figure 9.

The plate is provided with an aperture 32 and clip means 34 capable of retaining a snap-in unit 10. The diagonal cover is especially suited for the connection of thick and rather rigid cables.

The snap-in unit according to the invention may also be used for main distributing frames.

Figure 10 shows a section of a plate to be used in a main distributing frame. As shown in Figure 11, I-shaped slots and holes 36 are punched in a plate, e. g. of steel. The resulting flaps 34 are subsequently bent around 90°, thereby forming the clip means 34, as shown in Figures 12 and 13. As appears, the plate is easy to manufacture and the material removed from the apertures may be used to form the clip means.

The snap-in unit described above can be mounted without the use of tools, only by pressing the snap-in unit into the aperture of the associated mounting plate from behind, said mounting plate either being a front plate moulded in plastics, e.g. for a switch, or a metal plate as shown in Figure 10.

The locking flaps 34 closely abut the side surfaces of the snap-in unit 10 and the locking projections engage the slots 38. The connector is thus reliably secured during use. The connector will not loosen from the plate onto which it has been mounted even if subjected to a substantial inwards pressure, e.g. when a telephone plug is inserted in the connector from outside. This is among other things due to the combination of firm locking projections 20 and resilient locking flaps 34 completely abutting the quadratic block which makes up the body of the snap-in unit, said body being rather rigid per se. The combination does not yield to an inwards pressure. In contrast, several of the prior art snap-in units are provided with flexible locking projections spaced a small distance from the body of the snap-in unit, said projections being yieldable in relation to a rigid aperture, where the prior art solution causes an inwards force to be provided with a torque arm, which will make the locking projection tend to turn slightly thereby unintentionally releasing it from the rim onto which it was supposed to lock. Such an unintentional release is not possible with the snap-in unit according to the present invention, as the construction prevents a torque from arising between the contact surface of the snap-in unit (the front surface into which a connector is inserted from outside) and the contact surfaces of the locking flaps.

If the snap-in unit is to be moved after the mounting, it is released by forcing the locking flaps away from the locking projections 20 and subsequently by pulling out the snap-in unit. A small screwdriver or just a nail is sufficient tool to release the snap-in unit.

The snap-in unit according to the invention may be shaped in many different ways. Figures 14 and 15 thus show alternative embodiments in which the locking means of the snap-in unit have been replaced by a wholly or partially circumferential groove 26 in the body of the snap-in unit. The groove 26 is capable of co-operating with a latch 28, insertable in the groove following the insertion of the snap-in unit into an aperture 32. The stops 22 may be replaced by a wholly or partially circumferential, projecting edge or collar 22. If the connector type in question is sufficiently small, the snap-in unit may be made without the projecting parts 24. In that case the snap-in unit must be provided with a collar 48 adapted to abut the front surface of the mounting plate. According to this embodiment, the snap-in unit is thus adapted to be inserted from the front into the plate and is fastened from behind e.g. by means of a latch 28.

Other possible embodiments are shown in Figures 16 and 17. As shown in Figure 16, the snap-in unit may have a cylindrical body provided with locking projections 20 and locking knobs 22 which between them provide the base portion of snap-in unit with a substantially quadratic cross section. Such an embodiment may be advantageous for small coaxial connectors.

Figure 17 shows an embodiment consisting of a body 10 with a quadratic cross section and with a locking means in the form of two projecting strips, between them forming a deep groove which the rim of the aperture of the plate 30 can engage. As indicated by the dotted line, this snap-in unit is inserted by letting the rim of the plate engage the groove and tilting the snap-in unit in place, using the rim as the axis of rotation. The snap-in unit is retained by means of one or more locking projections 20, which e.g. may be shaped like the locking projections described above and which may engage a notch, e.g. of a locking flap 34, as shown and described in connection with Figures 6 and 7. Also in this embodiment the snap-in unit is provided with locking means on two sides adapted to cooperate with other locking means on the plate. It will thus be understood that the invention may be varied in many different ways and that the snap-in unit according to the invention is adaptable to other types of connectors, telephone connectors only being mentioned as a typical example of the application.

#### Claims

1. Snap-in unit for an electrical connector comprising a body (10) arranged to accommodate the connector, preferably a female connector, and provided with a socket, the front face of which in-

cludes an insert opening for the connector, characterised in that the socket including the connector is substantially rigid and has a quadratic cross section and that locking means (20) are provided on at least two sides (12, 14) so as to cooperate with other locking means (34) in connection with a rigid plate (30) with a quadratic aperture (32) able to accommodate the quadratic socket of the snap-in unit (10) in such a way that the quadratic front face is substantially parallel to the front surface of the plate.

2. Snap-in unit as claimed in claim 1, characterised by all four side surfaces (12, 14) being provided with the same form of locking means (20).

3. Snap-in unit as claimed in claim 1, characterised by the locking means on each side surface (12, 14) comprising at least one locking projection (20) and at least one stop (22), said stop projecting from the side surface of the snap-in unit (10).

4. Snap-in unit as claimed in claim 1, 2 or 3, characterised by at least two locking projections being on the same side surface (12, 14) of the snap-in unit (10) at intervals preferentially larger than half the width of the snap-in unit.

5. Snap-in unit as claimed in claim 1, 2 or 3, characterised by the same side surface (12, 14) of the snap-in unit (10) being provided with at least two stops (20) at intervals preferentially larger than half the width of the snap-in unit, or a continuous stop of corresponding size.

6. Snap-in unit as claimed in claim 1, characterised by the locking means comprising a locking slot in the body of the snap-in unit (10) and a latch (28) insertable in the locking slot (28) to retain the snap-in unit upon insertion in the aperture (32) of the plate (30).

7. Plate for the mounting of a snap-in unit as claimed in claim 1, 2, 3, 4, 5 or 6 provided with an aperture to accommodate an electrical snap-in unit, characterised by said aperture (32) being quadratic and provided with locking means (34) along the rim of at least one side of said aperture (32) on the rear side of the plate, said locking means co-operating with the locking means of the snap-in unit.

8. Plate as claimed in claim 5, characterised by the locking means comprising at least one and preferably two opposite flexible, substantially rectangular locking flaps (34) provided with a number of indentations or holes (36), said indentations or holes co-operating with the locking projections of the snap-in unit, and with a number of contact surfaces (38) for the stops (22) of the snap-in unit, said locking flaps extending from the rim of the aperture (32) and projecting substantially perpendicularly from the rear side of the plate.

9. Plate as claimed in claim 8, characterised by being provided with one or more quadratic ap-

ertures (32), each aperture being provided with two opposite locking flaps (34) on the rear side of the plate.

10. Mounting plate as claimed in claim 7, 8 or 9 and mountable in a socket box, preferably a socket box in the LK-FUGA series (trademark), characterised by being mounted with a snap-in unit as claimed in one or more of the claims 1 to 6.

Fig.1

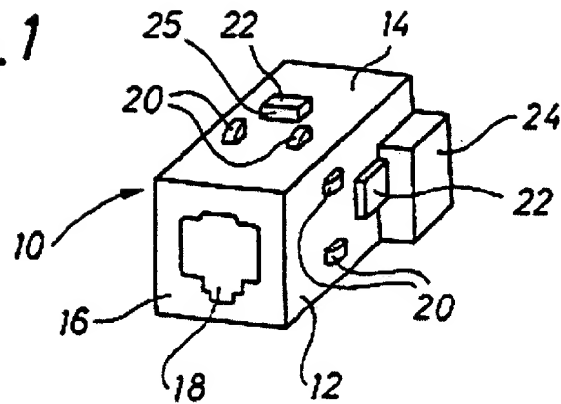


Fig.2

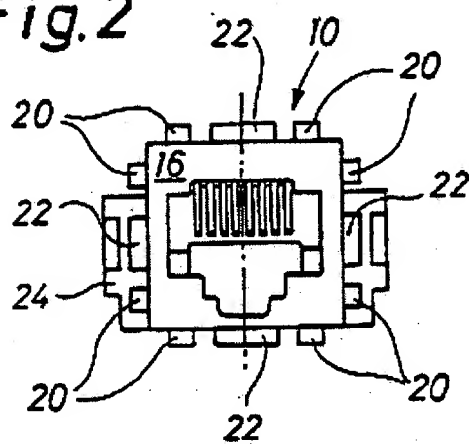


Fig.3

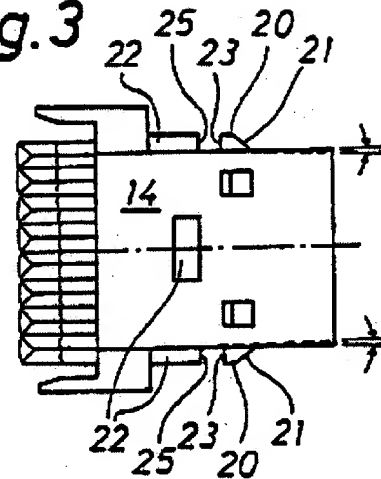


Fig.4

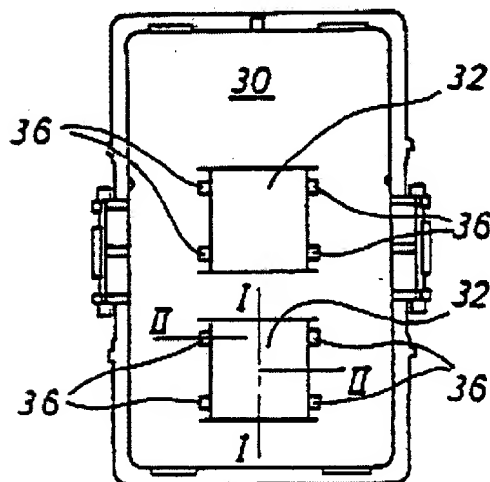


Fig.5

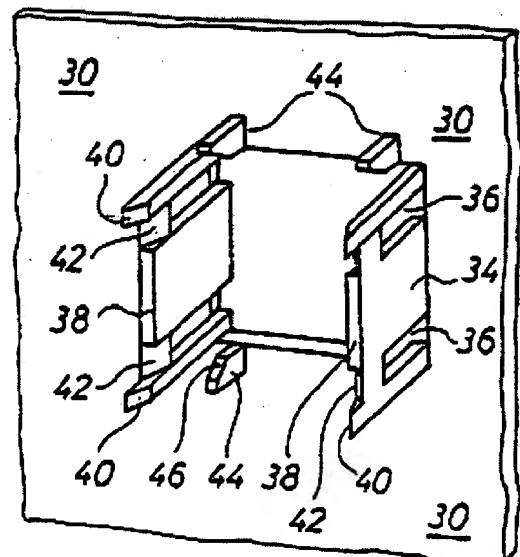


Fig. 6

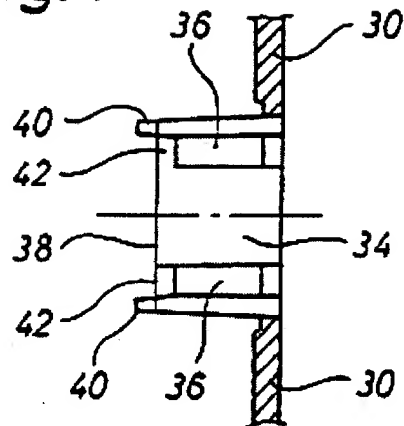


Fig. 7

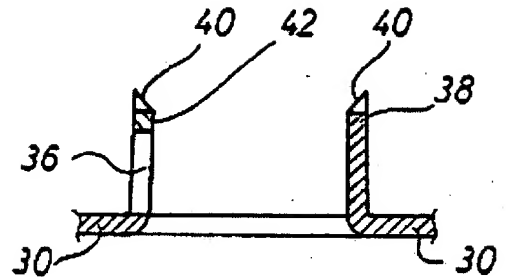


Fig. 8

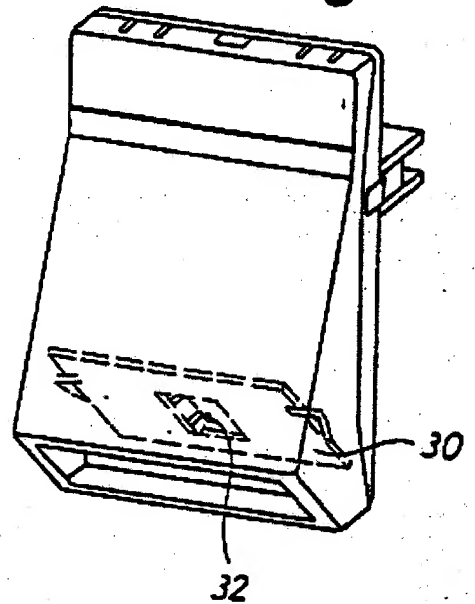


Fig. 9

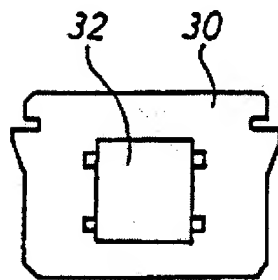


Fig. 14

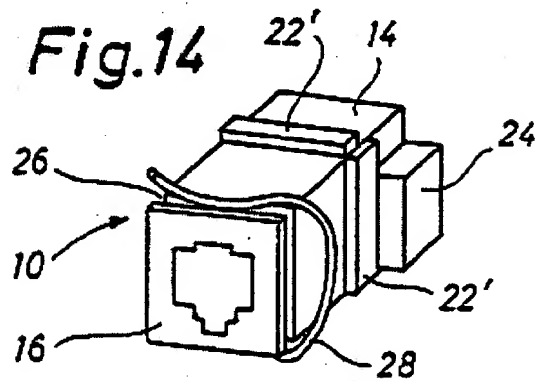
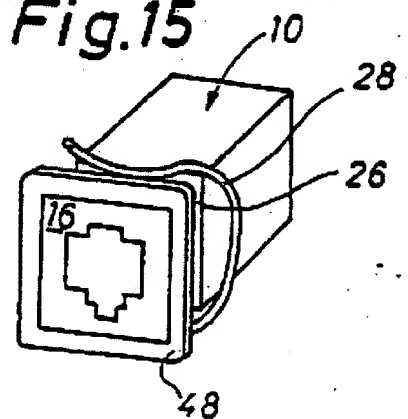


Fig. 15



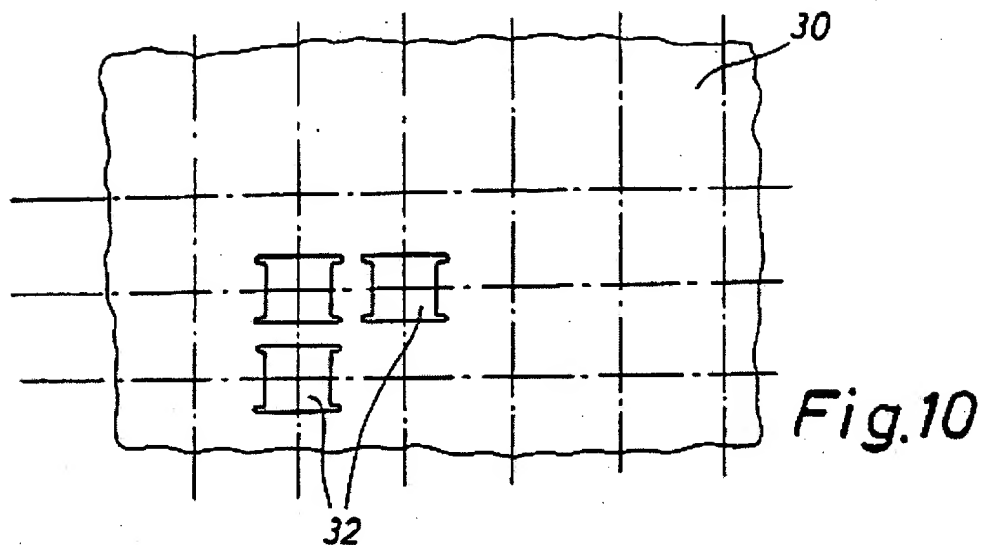


Fig. 11

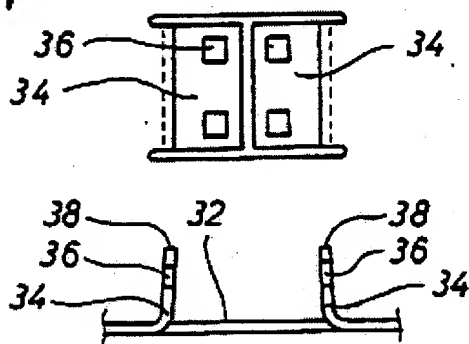


Fig. 13

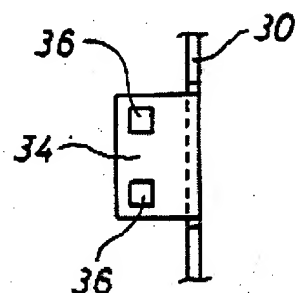


Fig. 12

Fig. 16

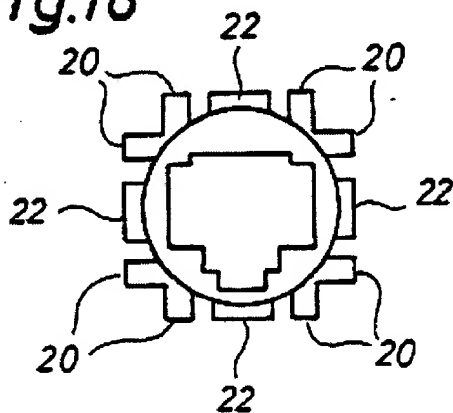


Fig. 17

